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SCIENCE AND THE NEWSPAPERS[1]

WHAT I bring this evening is a joint product. My partner-in-production is E. W. Scripps, the chief designer and builder of the Scripps-Howard newspaper enterprises. Of the great wealth gained by these enterprises Mr. Scripps saw fit to invest before his death a portion in such scientific ventures as the Scripps Institution of Oceanography at La Jolla, California, the Scripps Foundation for Research in Problems of Population at Miami University, Oxford, Ohio, and Science Service, Washington, D. C. The partnership lasted during the nineteen years of my incumbency of the directorship of the institution at La Jolla. Its purpose was to devote as many hours per week as possible to the personal discussion of all the problems humankind hath ever encountered or is likely ever to encounter—such having been the spiritual appetite of the senior partner.

THE NEWSPAPERS

By the popularization of science is understood in this address the promotion among people generally of that devotion to truth which is basic among the few people whose professional career is the pursuit of truth through scientific research. The scattering abroad of natural knowledge discovered by such research is regarded more in the capacity of that knowledge to promote devotion to truth than for any of the other uses to which such knowledge may be put.

To the making of our civilization many factors have contributed. Probably no two persons would agree on a list of the most important of these factors, or on a valuation of the different factors. But all would agree that among the foremost in influence are science and journalism. No phase of our life escapes the influence of both. From matches and beads to the ministry and birth-control nothing is out of reach of the penetrating gaze of science or the clatter and yell of the public press.

If evidence is wanted of the power of these factors, all that is necessary is to start something of major interest to the community. Launch a world war, or a world-wide health campaign, and note the instant and insistent appeal of the enterprise to both factors. Modern life depends vitally on both; yet its estimates

[1] Address at a general session, American Association for the Advancement of Science, Nashville, December 29, 1927.

of them, its attitudes toward them, are very different; and the estimate and attitude of each relative to the other is but a reflex of the generally prevailing estimate and attitude.

To the average member of the community and to many a newspaper man, pure science is as dry as dust and about as useful. True enough, now and then the researcher hits upon something, radium or "glands," that has a real kick in it. But this is accidental. Such lucky hits are not of the true nature of science. Indeed, the investigator is so blind to the business possibilities of the hits he occasionally makes that nothing of their real value is brought out until some practical chap—some good business man—comes along and converts them into dollars and cents.

Counterwise the typical investigator's conception of the average newspaper man, especially of the typical reporter, is that he is first and foremost "sensational." No matter how little or how much your typical scientist says in describing newspaper and newspaper men, that word, or some other containing the same meaning, must stand central in it.

On the whole, the newspaper press is sensational; some exceptions there surely are, but too few to affect the general situation. It is notorious that the occasional newspaper which is not sensational is apt to be a business failure. A daily newspaper that is not predominantly yellow is pretty sure to be predominantly red in its balance sheet.

"But," say the newspaper men who make their papers business successes by making them sensational, "the fact that people buy our papers is proof positive that we are furnishing them what they want; and surely we are not responsible for the people's tastes."

We find ourselves confronted at every turn by the problem of that in human nature which makes for emotionalism, for sensationalism. The aspect of the problem which we meet here is as to whether all mankind, save only the minute fraction known as scientists, are so constituted as to make them want what the sensational press gives them. Are scientists as a class wholly apart from the rest of mankind in this? By no means. As to matters outside their special interests and work scientists are obviously not fundamentally different from their fellow mortals. But even here they are not. The popular conception of science as something utterly unemotional—as flourishing only in the frigid zone of mental life—is all a myth. Effective inquiry into the hidden things of nature is no more possible without the energizing warmth of emotion than is creative effort in poetry or music. The real psycho-biological problem is as to the way reason and emotion are compounded in science as compared with the way they are compounded in art.

The special point to be made here concerns the particular effect the emotional responses of scientists have on the problem of making scientific knowledge comprehensible and accessible to the general public. No one who is familiar with the little class of scientific investigators needs to be told of the intensity, often the bitterness of the rivalry, that may exist there not only as to institutional and positional preferment but as to discoveries, conclusions and theories. The question of who of several rival experts in the same specialty are most competent—are the best authorities—is often very perplexing for those whose function it is to teach science to people at large, whether in classroom, on lecture platform, or through the printing press.

This is merely saying that scientific investigators like all normal members of modern civilized society are persons in whom rational life and emotional life have to get on together in some way, that way determining the measure of wisdom and usefulness of such persons to themselves and to the community. Hence it happens that the utterances by investigators themselves are in some instances distinctly tinged with yellow. Such instances are especially common where certain results suggest, though in a wholly tentative way, conditions and occurrences in the future which would greatly affect human life. In other words, scientists sometimes exercise altogether too little wisdom in their use of hypotheses touching matters of great human concern, departing in so far from allegiance to the true spirit and method of science.

Is it possible, then, for two such diverse agencies to find a ground on which to work together for the common good? Many scientists have not hesitated to answer "No, such a ground can not be found because it does not exist." And seemingly many newspaper men have held the same view.

On its face the history of journalism does not encourage hopefulness that it and science may find common ground on which to work. The only reference to science I find in one volume consulted is a brief narration of how the New York *Sun* increased its circulation by a yarn about the moon written by an educated reporter and boosted by Edgar Allan Poe. The hoax consisted of a lot of buncombe about an astronomical expedition to the Cape of Good Hope under the leadership of Sir John Herschel for investigation through a gigantic telescope of the moon and its vegetable and animal life. So well did the reporter and his booster do the job that the yellow and the white press and the scientists of the day are said to have swallowed the bait.

Science is the embodiment of rational life. Journalism is chiefly dependent on the emotional in life. The view is that these two lives are so antagonistic

that it is folly to talk about bringing them onto a common ground. The kinship of journalism is held to be with art rather than with science. The newspaper is animated more by the spirit of *belles-lettres* than by that of exact, positive knowledge. A list of well-known names in the history of American journalism and another in American letters have many in common. Journalism in this country has been, as Dana, Watterson and others expressly regarded it, a form of literary art; and nobody seems to doubt that it is now an industry and a business.

No two men of the early period of our national history have actually lived through the whole of that history on into this very day more than Benjamin Franklin and Thomas Jefferson. Their continuous vital presence in the life of America is due to their having been men of learning—men of science in the broadest and best sense.

Both men were likewise giant figures in the journalism of their day. Franklin's newspaper, *The Pennsylvania Gazette*, and other journalistic and publishing enterprises (one of which was *Poor Richard's Almanac*) were his vocation for some forty years and the main source of his considerable wealth. During this period his fame as a scientific investigator was chiefly won; and his success in his vocation, his fame as a scientist and his reputation as a wise citizen were the basis and stepping-stone to his great but later career in diplomacy.

Jefferson's relation to science and to journalism was less direct and close and is much less known than Franklin's. He appears to have been the first to see clearly, as a professional statesman, the great significance of the newspaper as a factor in popular government, and of science and popular learning as factors in a democratic society.

Although he seems never to have had any connection either proprietary or editorial with any newspaper, yet he it was who could say "were it left to me to decide whether we should have a government without newspapers, or newspapers without a government, I should not hesitate a moment to prefer the latter. But I should mean that every man should receive those papers and be capable of reading them."

It was through the astonishing power Jefferson had of influencing other men to write for the papers that he made the press contribute so largely to the promotion of his social and political ideas.

As holders of public office it was inevitable that Franklin and Jefferson should have had to stand the lash of criticism, both fair and foul, through the press. It is consequently desirable to know what effect their experiences with this aspect of journalism had on their general views.

In an essay entitled "An Account of the Highest Court of Judicature in Pennsylvania, *viz.* the Court of the Press," Franklin gives us his views on the subject. As to the power of this court, he says, it "may judge, sentence, and condemn to infamy, not only private individuals, but public bodies, etc., with or without inquiry or hearing, at the court's discretion." Concerning the "natural support of this court," Franklin concludes that it "is founded in the depravity of such minds as have not been mended by religion, nor improved by good education." Then he goes on to ask what can be done about it.

Having convinced himself that no legislative control of the court's activities is possible that would not be "construed as an infringement of the sacred liberty of the press," he looks in other directions for the needed control. He thinks he has found an agency which will restore to the people a species of liberty of which they have been deprived by our laws. "I mean," he says, "the liberty of the cudgel."

"My proposal is to leave the liberty of the press untouched, to be exercised in its full extent, force, and vigor, but to permit the liberty of the cudgel to go with it, *pari passu.*"

Jefferson is not on record so explicitly as Franklin on the tendency of newspaper liberty to run riot. But he said enough to leave no doubt that he saw and felt this tendency. Not long after he became president, he spoke of newspapers as "a bear-garden scene into which I have made it a point to enter on no provocation." Printers, like the clery he said, "live by the zeal they can kindle, and the schisms they can create." Accordingly, they "can never leave us in a state of perfect rest and union of opinion."

As to what might be done about it, Jefferson's view was less heroic than Franklin's. He held that while Congress had no power to put the press in a strait-jacket, the individual states might do so to some extent. It does not appear, however, that he would have the states go farther than to punish slander. And he concludes: "However, the steady character of our countrymen is a rock to which we may safely moor; and notwithstanding the efforts of the papers to disseminate early discontents, I expect that a just, dispassionate and steady conduct will at length rally to a proper system the great body of our country."

A shallow dip into the history of American journalism is enough to convince one that for a long time the "bear-garden scene" of Jefferson's characterization held good and also that the "liberty of the cudgel" proposed by Franklin was a practical if not a legal reality.

The period of what might be called bellicose journalism may be roughly put as extending from the

struggle between federalists and democrats during the beginning years of our present government to about 1850. Its peak may be regarded as having been reached with the use for advertising his paper (the New York *Herald*) James Gordon Bennett made of the cudgelings he got. Although Bennett appears to have come through all his personal encounters without permanent bodily injury, and to have profited greatly from them as publicity material, it may be inferred that to newspaper men generally this seemed rather too risky a form of advertising to justify its adoption on an extensive scale. For, on the whole, the "liberty of the cudgel" as a factor in journalism seems to have lost ground from about the end of Bennett's journalistic career.

It looks as though a close study of the subject would reveal Bennett's position to have had more significance than that of simply marking high-water in the physical bellicosity of journalism. He seems to have been one of the earliest discoverers that political journalism is bad. After an especially disappointing experience in this way shortly before starting the *Herald* in 1834 he declared himself through with politics. From about that time there seems to have gone on a slow but sure disentangling of journalism from party politics, and from alliance with any and all other special organizations and interests.

On the whole the freedom of the newspaper press has suffered more in America at least, from being tied up with special interests—political, business, religious, social or what-not—than from acts of government.

Our main contention is that although science is rooted more in man's life of reason than in his life of feeling, while journalism is rooted more in his life of feeling than in his life of reason, the devotion of both to truths peculiar to its own domain should constitute a ground on which the two may work together for the common good. The pursuit and dissemination of truth is as much the life of the newspaper press as it is of the research institution. Such a news-gathering agency as the Associated Press or the United Press *is* a research institution in a very real sense. A daily newspaper is essentially a collector from the community, and a narrator for the community, of information concerning the day-to-day happenings in the community. It is a sort of minute book of the community's daily life. Regardless of the extent to which news proper may be submerged in matters which have or seem to have no relation to news, after all, the news is the heart of the thing. Exactly what "news" is has been much debated. But whatever else it may be, it must include factual information chiefly about human life. Imagine any newspaper adopting a policy of making every news item as "sensational" as possible in utter disregard of the truth. How long would such a paper survive? Even if its plant escaped wreckage at the hands of an infuriated public, it could not escape financial wreckage.

The tendency to wholesale condemnation of the daily newspapers as "sensational" and "lying" ignores a great part of the most essential make-up of any given day's issue. The hundred-and-one notices of things that have happened and are scheduled to happen at home and abroad, in public affairs, in society, in school, in church, in sport, in business, in finance, in health, and so forth, concerning which there is no room for accusation of sensationalism, are forgotten when such condemnatory pronouncements are made. Except as legitimate interest is a form of sensation—of what is felt as contrasted with what is factually known—the basic substance of the newspaper is as true to life as is the basic substance of the most scientific treatise on human physiology or pathology, or on economics or sociology or politics.

Even as touching the most vital interests, that is to say, the most sensation-inducing interests, we find as emphatic expressions of allegiance to truth from journalism as from any calling whatever. Joseph Pulitzer's instructions to the editorial writers of the *Evening World* in connection with an election candidacy to the New York judiciary could hardly be surpassed in fidelity to truth.

> I want you to go into the Maynard case with an absolutely unprejudiced mind. We hold no briefs for or against him, as you know. I want you to get together all the documents in the case. I want you to take them home and study them as minutely as if you were preparing yourself for an examination. I want you to regard yourself as a judicial officer, oath-bound to justice, and when you shall have mastered the facts and the law in the case, I want you to set them forth in a four-column editorial that every reader of the *World* can easily understand.

Did a judge from the bench or scientist from the laboratory ever show more intelligent and determined effort in behalf of truth than that?

If the essence of journalism is the gathering and dissemination of truth in the form of news, and if the essence of science is the discovery and dissemination of truth concerning nature, then truth furnishes ample meeting ground for the two.

A single illustration of what this statement means, practically, must suffice. The extensive, though by no means universal support given to science by the newspaper in the Scopes' trial needs interpreting from two directions. Looked at journalistically it was a telling exhibition of that championship of freedom of speech and of the press for which journalism has always been famous. The attitude of many of the papers was primarily this: Regardless of whether

the theory of evolution has been fully established or not, it is supported by a great number of incontestable facts and is believed by many persons specially qualified to speak on the subject. The rank and file of the community are therefore entitled to have it presented to them by all competent agencies of education, whether the school, the press, or any other. The right and freedom of the general public to learn is as vital as is the right and freedom of individuals to speak.

Then there was the genuine effort by many papers to get and publish data on the merits of the controversy. A considerable study by Science Service and by myself personally of the part the newspapers took in the affair suggests that scientists have not fully appraised the case as evidence of the possibilities there are of the usefulness journalism may have to science.

And unquestionably journalism has worked cooperatively with science in many other cases. This can not, however, blind us to the fact that in some situations newspaper practice is diametrically opposed to that of science. For instance, the apparent deliberateness with which some newspapers will publish almost anything about sex that is lascivious but almost nothing about it that is scientific, astonishes scientifically minded people and undoubtedly tends to moral havoc for great numbers of people.

At the same time it must be recognized that scientific research has as yet achieved little in the fields which involve human interest and welfare and hence emotion at its greatest intensity that is comparable in trustworthiness with what it has achieved in other fields. For instance biological investigation has enlarged knowledge enormously concerning those reproductive and sexual phenomena which are remote from immediate, personal human interest. Their manifestation in lower organisms, plant and animal, and their cellular aspects in higher organisms, have received wonderful illumination at the hands of investigators. Furthermore, medical science has penetrated deeply into certain of these phenomena. But such of them as implicate with greatest intensity the lives of men and women in their relations with one another are only now beginning to have the searchlights of rigid investigation turned upon them.

Hence there is ample justification for hesitancy on the part of teachers of the public whether in school or press to give adherence and general publicity to the fragmentary and tentative findings of science in these matters. All that can be properly desired is that just so far as the results of investigations become trustworthy as evidenced by being generally agreed upon by those devoting themselves to the special inquiries concerned, the essentials of the results shall be given adequate place in educational effort.

What is said about scientific knowledge of reproductive and sexual phenomena, and the general dissemination of such knowledge, would be essentially applicable to various other blocks of phenomena which involve mankind's interests and emotions almost if not quite equally closely. For instance, so much of economic science as deals with, or by rights should deal with, those phenomena which have given rise to the familiar dictum "self-preservation is the first law of life" seems to be almost as backward from the standpoint of scientific research as are the aspects referred to of reproduction and sex. And religious phenomena are in similar state.

Our study to this point has brought out that the problem of the relation between journalism and science is in large measure the problem of the relation between man's life of reason and his life of emotion. It is thus only an aspect of the problem by which humankind is confronted in every major concern of its existence.

SCIENCE

Early in this discussion the conviction was expressed that we now have enough scientific knowledge of the nature of man and of the world generally to justify the belief that truth as newspapers conceive and pursue it, and truth as science conceives and pursues it, is sufficiently the same to constitute a common ground on which journalism and science might work together for the common good.

Such a union of interests and efforts may be greatly facilitated by the broadened and deepened understanding of himself man is now gaining through the great advances of science.

Many sciences have contributed to this enhancement of man's self-understanding. But, as should be expected, the sciences of living nature, in which the sciences of man are of course included, have contributed most.

The advances in biology particularly are bringing about a transformation in our conception of the origin and nature of living beings. The theory of evolution is passing into a new and radically different phase from those it has before passed through. This phase will concern man as he actually lives from day to day much more particularly than have the phases through which the theory has been passing during the last half century and more. Once the character of the new phase catches the newspaper eye (more properly, I suppose, the newspaper "nose for news"), it is a safe guess that one of the most spacious and inviting common grounds for journalism and science will have been discovered.

What is this ground stated in language that might pass muster as journalistic science?

First, as to the name of the theory in its new phase: emergent evolution has already been applied to it so widely, especially since C. L. Morgan's book by that name, that this christening seems likely to stick. But it appears that the thing itself has been expounded by a number of biologists in quite different terminologies, the expounders not having been fully aware until recently that they were expounding essentially the same thing. Workers in widely separated subdivisions of the biological realm have come to essentially the same conclusion as to the general nature of the reinterpretation to which the phenomena of organic development must be subjected. H. S. Jennings has long championed the idea under the name "radical experimentalism"; and the small group, including C. M. Child and C. J. Herrick, have been whaling away at it for years under the name "the organismic conception." Under essentially this caption I have spoken in my own peculiar way for the idea rather extensively during more than a decade.

From the side of traditional philosophy the naturalism of John Dewey has much in common with the world view implied by emergent evolution; and the "evolutionary naturalism" of Roy Wood Sellars is perhaps as close to that view as it is practicable for a strictly philosophical treatment of a subject to approach a scientific treatment of the same subject. Furthermore, A. N. Whitehead's theory of "organic mechanism," coming from mathematical physics, is surely a close relative.

Three points concerning this new phase of the evolution theory may be presumed to interest everybody because recognizable as likely to bear upon everybody's personal well-being.

1. Living individuals of organic nature, including individual men and women, boys and girls, adolescents, young children and just-born babies, are going to loom much larger in biological science than they have heretofore. A period of scientific interest in individuals is impending. The scientific-poetic doctrine of nature's great care for the species and great carelessness for the individual is nearing the sunset of its long, somber day.

The idea of emergence traced to its physicochemical foundation finds a peculiar form of organized individual to be indispensable to the occurrence of phenomena which characterize bodies as being alive, or living. The conception of "living matter" as if it were something unindividuated or only secondarily individuated must be abandoned.

This coming of the individual organism more prominently into the field of scientific attention will shift the major theoretic interest for a time at least from *evolution* in the racial and species sense to *development* in the individual sense. We may anticipate that before long the present vogue in many aspects of modern life of the great place accorded the individual will be traced to its connection with this element in the revised theory of evolution. Under the caption "personality" the individual is gaining special prominence in education, in industry, in medicine and in social intercourse.

2. The second point of general human interest in regard to "emergent evolution" may be stated with reference to the doctrine of the fundamental independence and separableness of body and mind. Fix your attention on the individual as growing in the sense of *emerging* through its various stages, fertilized egg, early and late embryo, just-born infant, childhood, and the rest, and you fail to find a trace of evidence of such a thing as a body independent of a mind or a mind independent of a body. Could man's knowledge of himself have begun with a knowledge of the egg and various embryonic stages of his individual development, such a theory as that of the independence of his body and his mind would never have occurred to him.

Historically viewed all forms of the idea of mind as independent of body are genetically kindred to the numberless varieties of ghost ideas of primitive man. The theory of psychophysical parallelism can be traced to the dualism manifested in these terrific mental aberrations of our savage ancestors. This theory recognizes that man has a mind and also a body, but, it says, the phenomena which constitute mind and those which constitute body are so different that they can not have any causal relation with each other.

Viewed from the standpoint of common adult experience in broad daylight this is an astonishing theory. When it became linked with the theory of man's derivative origin revived by Darwin, the conclusion was almost inevitable that while the origin of man's body could be causally explained, the origin of his mind could not be so explained. It was first surmised, then dogmatically held, that since it is impossible to explain mind, its existence is only an illusion. Hence consciousness became an epiphenomenon, if it exists at all; ethical and esthetic feeling and action became by-products of mechanical processes; and religion became a trait of childhood to be outgrown by every normal individual, and, finally, by the whole race.

With the moral monstrosity of these speculations we are only secondarily concerned. It is their scientific monstrosity that concerns us. The most distinctive attributes of the human species as compared with all other species are those on the basis of which this

species has produced agencies for human betterment and justice, science, art and religion. Yet here is a group of pre-scientific speculations espoused, elaborated and defended by science, that would deny the reality of these attributes, or reduce them to insignificance!

The theory of psychophysical parallelism, coupled with the mechanical theory of man's origin and fundamental nature, has infected man with the spiritual disease of misanthropy, cynicism and loss of self-respect. The contribution of the revised evolution theory to the cure of this affliction may be counted as one of the best fruits of the revision.

3. The last of the three points to be considered in connection with the new phase of the evolution theory concerns a probable shift of interest from the problems of when and how and where man originated to those of what he is, conceived as a *natural*, rather than in any part a *supernatural* being.

The conception of every individual organism as an emergent means that the degree of uniqueness, and the unifiedness which characterize the human organism, leaves no room for doubt of the objective reality of those attributes of man which make him a rational, a social, a moral, an esthetic and a religious animal, nor of the adequacy of the creative power of the natural order to produce man with all his physical and his spiritual attributes.

Man has arrived at a supremely critical stage in his millenniums of effort to make his positive knowledge of himself and of the world contribute in the highest measure to his own good. That stage is marked by the necessity of displacing the legendary, mythical and merely authoritarian knowledge which has constituted his theology by his verified and verifiable experiential knowledge of himself and the world, and of accomplishing this without impairing anything essential and valuable to the emotional aspect of his religion.

The chief lack of ability of both science and journalism (as of all other educational agencies) to face this tremendous situation is lack of preparedness to grapple rationally with three of man's attributes in which his emotional nature is most mightily involved. These attributes are his basic economic needs, his sexual impulsions, and his religious desires, hopes and fears.

Probably the most vital spot in this whole situation is the perception that religion is a response to the natural order; that it does not depend on a supernatural order or even a belief in such an order, as has been generally supposed. Man's belief in the supernatural seems to have resulted from his efforts toward a rational explanation of the peculiar form of his emotion here involved. The natural order to which this emotion is a response so vastly out-distances his factual knowledge and his scientific generalizations concerning it, that it is not surprising man should make hypotheses of the existence of bodies and powers quite outside of and above the natural order.

The contention that belief in the supernatural is a gigantic error into which man has been led in his effort to find a rational basis for the peculiar type of emotional response foundational to religion implies a change of attitude toward the natural order more deep and wide-reaching than any he has before had to undergo in his whole cultural history. It surpasses in human significance the change of attitude necessitated by the transition from the Ptolemaic to the Copernican astronomy because it implicates human life more directly.

Two considerations have impelled me to touch this ticklish subject. One is the composite nature of this production: My partner held, as a practical man, essentially the same views that I have sketched as a scientist. He would insist, were he with us, that once in the midst of such a treatment of our topic as that entered upon, we go through to the logical end, no matter how inadequately.

But the consideration that has pushed me hardest is the nature of the situation itself. That situation is, as previously indicated, before anything else, the problem of man's reaching a livable adjustment between his life of emotion and his life of reason.

If it is true that these conflicting aspects of man's nature are strictly natural phenomena and that the theory of evolution, especially in the phase now being entered, is the right approach to the great human problems involved, then it follows that the unified study and treatment of man in every aspect of his being is fundamental. We are faced with the necessity of bringing under one point of view for both research and practical treatment what are usually classed as "anthropology" and the "humanistic sciences," medicine, hygiene, human psychology and education ranging themselves within these two classes. Scientific research is already making considerable headway in some of the problems belonging to these intensely vital and hence equally emotion-manifesting domains of human life, and it is certain to push the efforts with more zeal and efficiency than ever in the future. But science must undergo a great renewal of self-illumination concerning its place in human life and its meaning for human welfare before it can achieve its greatest victories in such research.

A grave charge often made against science is that many of its devotees are disregardful of the sensibilities of persons who hold what the specialists know or believe to be erroneous ideas on points of vital human concern. In some instances this disregard has been

heartless, even to brutality. The psychologist who could tell his class to "park their souls out of doors" when they came to his class room, had at some time somehow suffered a bad twist to his mental and moral make-up. When and how the twisting happened, it may be impossible to tell exactly. But an important factor in it may be confidently supposed to be failure to recognize one of the most important differences between the physical sciences and the sciences of man. The difference referred to inheres in the different relation held by the investigator to what is investigated. The physical sciences are motivated entirely in the gaining of knowledge of, and control over, the objects and processes investigated. The well-being of what is investigated is considered not at all by the investigator. He may exploit his experimental materials without let or hindrance so far as their rights are concerned.

Quite otherwise is it in the sciences of man. In all these, knowing and controlling the objects and processes investigated are and must be subordinate, speaking broadly, to the wellbeing of the objects studied. The surgeon at the operating table may be taken to typify the essential relation between investigator and investigated in the whole group of sciences of man. Technical knowledge of investigator and skill of operator are here dedicated wholly to the purpose for which they primarily exist, namely, human welfare in the form of restoration to health of individual human beings. Obviously not in all these sciences can the objects studied become the beneficiaries of knowledge in such immediate personal way as in the case of the patient needing operative treatment.

How, then, are the benefits to be extended? Undoubtedly in many different ways, but most importantly through the increased intelligence of the public concerning the knowledge gained by the researches.

But again, how is such extension of intelligence to be accomplished? To illustrate, what part should school education play in making people at large effectively acquainted with the established results of investigations into the relation between the human sexes? What part should the newspapers play? What part should be taken care of in the home?

The evidence of the intellectual decadence of New England, so startlingly emphasized by Dr. Cattell's just-published résumé of his study of the distribution of scientific men in the United States, is too obvious in its sinister bearing on the future of our country to be missed by anybody who becomes acquainted with the facts. Is this study to be followed up so as to learn what factors are responsible for the decay, whether it affects all aspects of New England's cultural life, whether the disease is likely to extend to the entire nation? Suppose science should get certain or highly probable answers to these questions, how is the truth to be so brought home to the general public as to make it effective in the national life?

Because of the nature and complexity of the situation, I am going to do no more than make a suggestion which, if carried out, might do much to promote the desired end so far as journalism and science are concerned.

I suggest that the special efforts made at this meeting of the American Association toward increasing the dissemination of science to the public be the beginning of efforts in this direction that shall go much farther than anything of the sort this country has ever seen.

I suggest that the symposium held yesterday on publicity for science be repeated, perhaps many times, either under the auspices of this association or some equally competent agency, but extended in scope so as to secure the joint discussion between the very foremost representatives of the sciences and of the newspapers of the almost numberless points at which they impinge on each other, sometimes in friendliness, but sometimes in hostility.

Do not the indications of growing desire by newspapers for scientific news and opinions justify the belief that the time is favorable for such a move? It seems to me the results of the study just reported by the Permanent Secretary of the American Association of the space given by newspapers to the scientific proceedings of recent meetings of the association may be interpreted in this way. This instance by no means stands alone on the side of journalism itself in affording like encouragement. Is it possible that journalism is more ready than science for such a move?

We are all patriotic Americans. As men of science we may claim more. We may claim that our patriotism embodies knowledge of, and devotion to, the best ideals and traditions of Americanism. A few critics of America, some foreign and some of our own number, are saying that American ideals as held by the founders of the Republic have gone by the board. I would like this partnership address, as I have called it, to be viewed as an attempt by one journalist, E. W. Scripps, and one scientist, myself, to join forces in support of the basic ideas of journalism, of science, and of Americanism that were held by those two master builders of our Nation, Benjamin Franklin and Thomas Jefferson.

WM. E. RITTER
SCIENCE SERVICE, WASHINGTON, D. C., AND
UNIVERSITY OF CALIFORNIA

MALNUTRITION IN PLANTS

NUTRITION problems are quite as common in plant as they are in animal life, and in both cases these problems become most evident where the living organ-

n is forced to develop under unnatural environ-ental conditions. In plant life when plants are fed tificially, many disorders are common and recog-zed, and these disorders are most evident in plants hen their culture is attempted under climatic and il conditions to which they are not naturally dapted. The orchard industry as practiced in the ore or less arid sections, both with and without rigation, furnishes an outstanding illustration of is fact. In nature, orchard trees are best adapted humid regions having a soil comparatively well pplied with organic matter and nitrogen, and here the precipitation is so distributed as to cause e plant food in the soil to become available through cterial action in about the proper amount and pro-ortion to meet the demands of the growing plant. hen attempts are made to grow such trees in the id regions where soils are primarily not abundantly pplied with organic matter and nitrogen and where oisture must be furnished either by irrigation or conservation through clean cultivation, nature's fluences are decidedly modified.

Among the apparent nutritional disorders of or-hard trees in the arid regions the "disease" sometimes eferred to as "roseatte," or "small leaf," or "die ack," or "mottled leaf," or "multiple bud," is quite ommon. Its main symptom is that large numbers f small leaves develop in clusters in a more or less oseatted arrangement on the ends of twigs. Cultural ndications are that soil nitrogen is a contributing actor to this abnormal condition. The influence of vailable nitrogen on the development of some of our nnual plants is fairly well understood. For instance, arge supplies of soluble nitrogen when present in the oil during the tillering stage of wheat will cause the lant to set many stools, when present after the joint-ng stage they result in luxuriant vegetative growth nd during the fruitation stage their tendency is to produce a grain high in protein. While the influence f nitrogen in the development of a perennial plant ike an orchard tree is not so easily traceable, and herefore, not so well understood, it is only reasonable o suppose that such influences may be quite as evi-ent and prove quite as effective once it is learned ow they may be detected. Using the "disease" re-erred to as an illustration of a case of malnutrition et us see what the conditions are under which it de-velops and the practices that have been effective in its control, so that a proper basis for a diagnosis may be established.

This roseatted condition develops under both irri-gated and non-irrigated conditions in the more arid ections of the state of Washington where trees are grown under clean cultivation. When this "disease" which interfered so materially with the production of marketable fruit that it made the business unprofit-able, was first experienced the more radical growers pulled up their orchards and resorted to the produc-tion of other crops from which the required returns could be derived. The more conservative orchardist left his trees but attempted to grow a crop between the rows. Alfalfa was known to be well adapted and it was introduced. This crop not only proved fairly profitable, but to the grower's surprise the orchard trees took on a deeper green foliage, made a more luxuriant leaf and wood growth and the roseatted condition rapidly disappeared. The natural effect of this beneficial influence on the trees was that not only alfalfa but other legumes were rapidly introduced in the growing orchards so that now there is little clean cultivation practiced where the irrigation water supply is adequate to make intercropping possible. The first reaction from such results might well lead to the con-clusion that the beneficial effect of legumes in this relationship is traceable to their nitrogen fixing power and this is justifiable on the basis that most of the irrigated soils are, even in their virgin state, not over well supplied with nitrogen. Where intercropping with legumes was considered impracticable due to prejudice or to the lack of sufficient irrigation water, it was concluded, and reasonably so, that the same benefits could be derived if the trees were supplied with a readily available nitrogen fertilizer. In actual practice, however, this did not follow because it proved that the beneficial results produced by the legume could not always be duplicated in that way. Furthermore, roseatted trees were not always asso-ciated with nitrogen deficiency in the soil, because in a few cases trees growing in hog lots where there was every evidence of an adequate nitrogen supply also developed the "disease." Animal manures, on the other hand, when applied to roseatted orchards in liberal amounts were just as effective in overcoming this nutrition problem as were legumes.

Although these apparent inconsistencies may be difficult of complete explanation on the basis of actual controlled experimental work, it is reasonable to con-clude that the form in which the nitrogen is applied and the time at which the application is made is a very important factor. In the orchard sections of the State of Washington it is not uncommon to have long periods of comparatively warm weather and con-siderable rainfall after the trees have reached their dormant state in the fall. This warm weather and the optimum soil moisture supply promote nitrifying bacterial activity with the result that in clean culti-vated soils where there is no vegetative growth to utilize the nitrogen so made available, large amounts of nitrogen frequently accumulate in the autumn season. Where the succeeding winter precipitation

is not sufficient to cause the accumulated nitrates to be leached into the drainage system, a condition that prevails in most irrigated sections, a comparatively large amount of available nitrogen will be present in the soil and ready to function as soon as the growing season begins in the spring. Such supplies of available soil nitrogen are not possible in the humid climates naturally adapted to tree growth and it is only reasonable to suppose that this abnormal food supply in the spring will produce abnormalities in tree development.

Liberal supplies of available soil nitrogen are conducive to excessive vegetative growth and in the case of trees nitrates, present in large amounts in the very early spring, may serve as a stimulant for the development of a large number of buds and leaves. When later in the season this supply of nitrates is exhausted as is likely to be the case with these soils, which are at best not abundantly supplied with total nitrogen, there is no corresponding twig growth and elongation. The result is that the leaves are left in a light green colored, partly developed state, grouped close together near the ends of branches. The use of a nitrogen fertilizer, instead of overcoming this condition, as was at one time supposed, may even aggravate it if the application is made at the wrong time of the year. Surely it would seem illogical under such conditions to make heavy applications of readily available nitrogen fertilizers in the late fall, winter or early spring.

In orchards where legumes are grown to supply the nitrogen, the situation is different. The conditions that are conducive to the bacterial activity essential for nitrogen fixation by legumes and for the decay of soil organic matter necessary to release nitrogen for plant use, are the same conditions that promote best tree growth. There should be little danger, therefore, of the accumulation of an abnormal supply of available nitrogen, under conditions where that element of plant food is supplied by legumes or by slow acting organic fertilizers. That this is borne out where legumes are grown has been shown and it is also known that the roseatted condition does not develop but can be overcome when animal manures are used to supply the nitrogen. The property of manure to supply regular and normal amounts of available nitrogen in the proportion that the growing plant demands them has caused this fertilizer to become known as being "fool proof." When plants are fed with artificially prepared fertilizers of high availability an attempt should be made to apply such fertilizers at the time and in the proportion that they are required if best results are to be obtained, and this is especially true where perennial plants are grown and when the quality of the product is a factor. If these relationships are once properly understood many malnutrition problems can be controlled and commercial fertilizers may be used to exert influences on yield and quality never before credited to or claimed for animal manures.

F. J. SIEVERS

STATE COLLEGE OF WASHINGTON,
PULLMAN

SCIENTIFIC EVENTS

BUDGET OF THE BUREAU OF CHEMISTRY AND THE BUREAU OF BIOLOGICAL SURVEY

THE budget of the U. S. Department of Agriculture for the fiscal year 1929 (see SCIENCE, LXVII, page 186), which has been transmitted to congress by the president, includes the following recommendations for the work of the Bureau of Chemistry and Soils and for the Bureau of the Biological Survey:

Bureau of Chemistry and Soils, $1,244,963, which includes increases of $15,000 for studying methods for diversifying products made from sugar-cane and originating new products; $10,000 for food research, including a study of the deterioration of foods due to micro-organisms, chemical agencies, etc.; $10,000 for a study of the commercial utilization of citrus fruits, pomegranates, avocados, pears, prunes and other fruits; $10,053 for experiments and demonstrations in proper methods of removing and curing hides and skins, and study of little-used native tanning material and of foreign tannin-bearing plants; $5,000 for fundamental investigation of the chemical properties and utilization of lignin; $3,000 for extension of studies on the composition and utilization of vegetable oils and fats; $10,000 for investigating the possibilities of utilizing sweet-potato culls for the production of starch and conversion products; $10,000 for the development of new insecticides and fungicides; $10,000 for enlargement of research work on the causes and methods of control of farm fires; $5,000 for inaugurating studies of new processes and equipment for the production of naval stores, in cooperation with producers and the Forest Service, as well as a study of the adaptability of naval stores for various uses; $5,000 for expanding the work necessary to properly coordinate the chemical investigation of soils with the classification and mapping of soil types; $6,060 for investigation of methods of producing nitrogen fertilizer; $5,000 for a study of the production of phosphoric acid in a more desirable form than acid phosphates, and for potash investigations; $6,000 for bringing up to date the soil-survey map drafting work; $9,485 for studying the causes and developing methods for remedying destructive soil erosion; $4,650 for further crop experiments with air-derived nitrogen and other concentrated fertilizers; $2,350 for soil fertility and fertilizer studies on sugar-cane soils in Louisiana, Florida and other southern states, and $3,360 for additional editorial assistance and other general administrative work.

Bureau of Biological Survey, $1,078,500, which includes

increases of $1,480 to provide for additional clerical assistance in the general administrative work of the bureau; $2,500 for laboratory and field work on the perfection of rodent and predatory animal poisons; $6,000 for extension of the campaign for the destruction of injurious rodents; $10,000 for predatory animal control operations; $3,500 for researches on the food habits of water-fowl; $8,000 for extending the study of food habits, diseases and parasites of game animals, fur-bearing and predatory animals; $5,000 for the employment of additional game wardens, and $14,000 for administrative expenses in connection with the acquisition of land for the upper Mississippi River wild-life and fish refuge. There is an apparent decrease of $3,000 in the item for maintenance of mammal and bird reservations, but, due to the release of $18,000 provided in 1928 for fencing on the Wind Cave Game Preserve in South Dakota, there is actually $15,000 additional available for other work, as follows: $600 for minor construction work on the Big Lake Bird Reservation, Arkansas; $3,000 for work incident to the disposal of surplus animals in big-game preserves; $7,230 for the construction of various buildings and shelters and for necessary implements at big-game preserves; $1,000 for water development work on the Wind Cave Game Preserve; $900 for fencing at Sully's Hill Game Preserve, North Dakota, and $2,270 for care and maintenance of lands donated to the government by the Izaak Walton League as an addition to the winter elk refuge in Wyoming. A decrease of $4,000 is made in the fund for the purchase of land for the upper Mississippi River wild-life and fish refuge, the balances from prior appropriations being sufficient, under present purchase limitations, to take care of payments under contractual obligations during the fiscal year 1929.

THE GIANNINI FOUNDATION OF THE UNIVERSITY OF CALIFORNIA

FORMAL tender of a gift of $1,500,000, to be devoted to the study of agricultural economics, has been made to the regents of the University of California by Bancitaly Corporation, "in tribute to A. P. Giannini, of San Francisco, and to be named after him." As already recorded in SCIENCE, one third of the gift is to be used for the construction of a building for the College of Agriculture, to house the works of the Giannini Foundation, and $1,000,000 to be used as an endowment for the foundation.

In making the announcement, President W. W. Campbell, of the University of California, said in part:

As a result of Mr. Giannini's feeling, expressed to me some months ago, that he wanted to do something for the agriculturists of the state, that it is the very opposite of his philosophy of life that a man be rich at the time of his death and that he wanted to do something through the University of California for the farmers of California, conferences have been held since that time getting these ideas clarified; and Mr. Giannini has decided to extend to the regents of the University of California a gift of a million and a half dollars to establish and support a foundation of agricultural economics. Of course I shall recommend that it be designated as the Giannini Foundation of Agricultural Economics, although neither Mr. Giannini nor any of his friends have made any such suggestion.

My recommendation that we complete the agricultural college group of buildings now consisting of Agricultural Hall and Hilgard Hall by the construction of a counterpart of Hilgard Hall, the three buildings to enclose the agricultural quadrangle on as many sides, part of the building to accommodate the activity in agricultural economics, met his approval. This will call for approximately half a million dollars.

The activities of the foundation are to be embraced by the great field of agricultural economics, and relate to such subjects as: (*a*) the economic consideration of increased production, which results from improved seed grains, improved nursery stock, improved livestock, improved methods of farming, all these brought about largely through researches conducted by colleges of agriculture, and from the use of improved farm machinery; (*b*) the economic consequences of overproduction and underproduction arising from unusually favorable seasons or unusually unfavorable seasons as to weather and other conditions in the nations producing the agricultural product concerned, such as grains, cotton, etc.; (*c*) relations between conditions existing in the farming industry and the general economic conditions prevailing in the nation and internationally; (*d*) the methods and problems of disposing of farm products in the markets of the world on terms or conditions giving the maximum degree of satisfaction to the growers; (*e*) the economic questions which concern the individual farmer and the members of his family, and affect their living conditions, and so on.

It may be assumed that the Giannini Foundation of Agricultural Economics will be privileged to produce results of enormous value to the agricultural industry in California, not only in the years and decades immediately ahead but as a continuing foundation in perpetuity.

The offer of the gift was accompanied by a check for $25,000; this is to be followed by another for $475,000 within two months, and the remaining $1,000,000 to be made available as it is needed.

PRESENTATION OF THE CHARLES P. DALY GOLD MEDAL TO PROFESSOR ALOIS MUSIL

ON the evening of February 21, at a meeting of the American Geographical Society of New York, the Charles P. Daly gold medal of the society was presented to Professor Alois Musil, of Charles University, Prague, in recognition of a lifetime devoted to explorations in northern Arabia and Mesopotamia and to historical researches relating to this part of the world. After the ceremony, Professor Musil delivered a lecture entitled "Desert Life in Northern Arabia." We have received from the American Geographical

Society the following account of Professor Musil's work:

Professor Musil is now recognized as the foremost living authority on the topography, history and folklore of the desert tracts lying between the settlements of Palestine and Syria on the west, the Tigris on the east, and the oases of Nejd on the south. Since 1896 he has spent many seasons in the field in the course of journeys on camel-back covering a total distance of no less than 13,000 miles. An extremely close observer, Professor Musil has recorded on his maps detailed topographic features and place-names over broad districts previously wholly unexplored. By comparing the results of his field work with the ancient documentary sources, he has been able to reconstruct the probable course of historical events that have hitherto proved enigmas to students of the Old Testament, and to Assyriologists, classicists and Arabicists. His most sensational discovery was made in 1898 on the edge of the desert east of the Dead Sea. Here he found the Kuseyr 'Amra, well-preserved ruins of a summer residence built by the Omayyad caliph Walid II in the eighth century of our era. The interior walls of this structure were decorated with paintings illustrating the adventures of the caliph in the hunting field and with portraits of the fallen rulers of the various countries which had been brought under Moslem subjection—among them one of Roderick, the last Visigothic king of Spain. From the geographical point of view Professor Musil's most striking work was the determination of the position of the main watershed of northern Arabia and the exploration of the fringes of the Nefud, or great sand waste that lies between Nejd and the Hamad steppes (sometimes called the Syrian desert). Professor Musil also traced the lower course of the River Tharthar, in the interior of Mesopotamia, to its outlet in an unexplored salt lake on the floor of a depression fifty meters below sea-level. Reports of this stream may have given rise to the classical legend of Tartarus, river of the underworld.

Professor Musil has made an extremely important contribution to our knowledge of Bedouin folklore. Accepted as a member of the Rwala tribe, on equal terms with their head chief, he was enabled to study the life of these nomads in its minutest details. He records, translates and explains several hundred of their songs in his volume, "The Manners and Customs of the Rwala Bedouins."

The results of Professor Musil's researches prior to 1908 were published in two great series by the Vienna Academy of Science: "Kusejr 'Amra" (in 2 volumes) and "Arabia Petraea" (in 4 volumes); the latter is accompanied by a map of Arabia Petraea on the scale of 1 : 500,000. His field work of 1908–1915 is described in a series of six volumes, the publication of which by the American Geographical Society has been made possible through the generosity of Charles R. Crane, Esq. Five of these six volumes are devoted to the narratives of the explorer's itineraries and to historical essays on the various regions visited. Three volumes are now in print ("The Northern Hegâz," 1926; "Arabia Deserta," 1927, and "The Middle Euphrates," 1927). Two more will be published in the course of 1928 ("Palmyrena" and "Northern Negd"), and the sixth volume of the series ("The Manners and Customs of the Rwala Bedouin") will also appear before the close of the present year. Forming an integral part of this series are three maps: The Northern Hegâz, 1 : 500,000; Northern Arabia, in four sheets, 1 : 1,000,000, and Southern Mesopotamia, 1 : 1,000,000.

NATIONAL RESEARCH FELLOWSHIPS IN THE BIOLOGICAL SCIENCES

THE Board of National Research Fellowships in the Biological Sciences met on February 10 and 11 and made the following awards for the year 1928–29:

Reappointments

Kenneth Cole—Biophysics
Robert Emerson—Botany
M. B. Linford—Botany
Louis W. Max—Psychology
G. G. Pincus—Zoology
Jack Schultz—Zoology
R. H. Wallace—Botany

New Appointments

F. M. Carpenter—Zoology
F. E. Clements—Anthropology
S. H. Emerson—Botany
Eileen W. Erlanson—Botany
Clay G. Huff—Zoology
C. F. Jacobsen—Psychology
D. A. Johansen—Botany
P. A. Readio—Zoology
D. C. Smith—Zoology
M. T. Sonneborn—Zoology
R. C. Tryon—Psychology

The second meeting of the board for further appointments for 1928–29 will be held the latter part of May, and applications for consideration at that time are requested by April 15. The necessary forms and information for making application may be secured from the Secretary, Board of National Research Fellowships in the Biological Sciences, National Research Council, Washington, D. C.

FRANK R. LILLIE, *Chairman*,
Board of National Research Fellowships in the Biological Sciences

SCIENTIFIC NOTES AND NEWS

IN recognition of his research work in the field of catalysis, the Nichols medal was formally awarded to Dr. Hugh Stott Taylor, David B. Jones research professor of chemistry at Princeton University, on March 9. The presentation of the medal followed a dinner at the Chemists' Club, given by the New York section of the American Electrochemical Society, the Society of Chemical Industry and the Société de Chimie Industrielle. After speeches by Dean James Kendall,

of New York University, and Professor Wilder D. Bancroft, of Cornell University. Professor Arthur W. Thomas, of Columbia University, chairman of the jury of award, presented the medal to Professor Taylor, who then described his work on catalysis.

THE Messel Medal of the British Society of Chemical Industry has been awarded to Dr. R. A. Millikan, director of the Norman Bridge laboratory at the California Institute of Technology, in recognition of his achievement in measuring the electrostatic charge of the electron.

PROFESSOR W. H. WRIGHT, astronomer of the Lick Observatory, has been appointed George Darwin lecturer for 1928 of the Royal Astronomical Society. The lecture will be delivered in June, and will probably deal with the photography of the planets with different color filters.

DR. LAWRENCE J. HENDERSON, professor of biological chemistry at Harvard University, is giving the Silliman lectures for 1928 at Yale University on "Blood: A Study in General Physiology." The course will consist of six lectures, is given on Mondays, Wednesdays and Fridays, from March 12 to 23, inclusive.

DR. OYARTZUN, curator of the Anthropological Museum, Santiago, Chile, has been awarded the gold medal of the University of Würzburg.

DR. PAUL FLECHSIG, professor of psychiatry at the University of Leipzig, has been elected an honorary member of the Psycho-Neurological Academy of Leningrad.

THE rank of officer of the Legion of Honor has been conferred on Dr. Pierre Fredet, a well-known Paris surgeon and senior medical officer of the Paris, Lyons and Mediterranean Railway; Dr. Loeper, professor of therapeutics in the Paris faculty of medicine; Dr. Abadie, professor of nervous and mental diseases at Bordeaux, and Professor Léon Blum, of Strasbourg.

PROFESSOR CLEMENS PIRQUET, of Vienna, has been elected president of the International Union of Child Welfare in succession to the Duke of Atholl.

PROFESSOR WILLIAM H. WELCH, of the Johns Hopkins University, has been appointed a member of the Baltimore Revision Commission. The commission will consider the revision or amendment of the City Charter and the City Code.

DR. ELLIOTT C. CUTLER, of Cleveland, has been elected to succeed Dr. Montrose Burrows as chairman of the committee on the protection of medical research of the American Medical Association.

DR. RICHARD P. STRONG, professor of tropical medicine at the Harvard Medical School, was guest of honor at a dinner given by the Harvard Union on March 1, where he exhibited moving pictures taken last year in Africa on an expedition under the auspices of the Medical School of Harvard University.

STANLEY P. YOUNG, of Colorado, has been appointed head of the division of economic investigations of the U. S. Bureau of Biological Survey, in charge of the department's rodent and predatory-animal control operations. He succeeds Dr. A. K. Fisher.

DR. OLIVER BOWLES, formerly supervising engineer of the Non-metallic Minerals Experiment Station of the U. S. Bureau of Mines at New Brunswick, N. J., has been transferred to the economics branch of the bureau to be chief of a new structural materials section, having charge of economic studies in the major non-metallic minerals and their products.

WILLIAM L. HALTOM has been appointed curator of the Alabama Museum of Natural History, to succeed H. E. Wheeler, resigned.

PROFESSOR RICHARD R. FENSKA is spending his sabbatical year from the New York State College of Forestry as forester for the Massachusetts Forestry Association.

RAYMOND L. DITMARS, curator of reptiles at the New York Zoological Park, sailed for Honduras on March 6, where he will collect poisonous snakes for the production of serum.

GREGORY MASON, explorer and author, sailed from New Orleans on February 7, at the head of an expedition being sent out by the Museum of the American Indian, of New York, to search for evidences of Mayan civilization.

PROFESSOR J. E. HOFFMEISTER, of the University of Rochester, and Professor H. S. Ladd, of the University of Virginia, will sail early in April for the South Pacific to continue geological field work begun in 1926. Professor Hoffmeister is studying the geology and paleontology of certain islands in the Tonga Group, while Professor Ladd is carrying on similar work in Fiji. They will return about the middle of September. The work is being done under the auspices of the Bernice P. Bishop Museum of Honolulu.

DR. STANLEY COBB, Bullard professor of neuropathology at the Harvard Medical School, is on leave of absence for the second half of the current academic year and will go to Munich to work in neuropathology and psychiatry.

AFTER nine months' absence in Africa, L. W. Kephart and R. L. Piemeisel, plant explorers of the U. S. Department of Agriculture, have returned with more than 160 lots of seed of different grasses and forage

plants and 400 specimens of other plant life. It is hoped that some additions to the pasture and meadow forage of the United States will result from this expedition.

MISS MARY PROCTOR, the astronomical author, arrived in New York on March 6 for an American lecture tour during which she hopes to raise money for the construction, probably in southern California, of the world's largest astronomical telescope.

DR. NILS G. HÖRNER, of Uppsala, Sweden, Scandinavian-American fellow, has spent the fall and winter as a visitor in the department of geology at Harvard University. He has recently been appointed a fellow of the Liljewalch fund of Uppsala University, which will enable him to make a geological excursion in Western United States beginning about March 15.

THE first lectures under the William Sydney Thayer and Susan Read Thayer lectureship in clinical medicine at the Johns Hopkins University School of Medicine will be delivered by Sir Humphry Rolleston, Regius professor of physic in the University of Cambridge, England, on March 20 and 21. The titles of the lectures are "Hereditary and Familial Diseases of the Blood Forming Organs" and "Diseases Peculiar to Certain Races."

DR. GEORGE BARGER, professor of medical chemistry at the University of Edinburgh and non-resident lecturer in chemistry at Cornell University during the present semester, will give three Dohme lectures at the Johns Hopkins University early in May.

THE annual William Lowell Putnam memorial lecture will be delivered on March 21 by Professor Constantin Carathéodory, of the University of Munich, who will speak on "Selected Problems in the Calculus of Variations."

PROFESSOR ALBERT EINSTEIN, of the University of Berlin, will deliver the inaugural lecture of a first course of international university extension lectures, to begin at Davos on March 18. The object of the institution is to enable students in delicate health to continue their studies in the Alps.

THE thirteenth Guthrie lecture of the British Physical Society was given by Sir Joseph Thomson, F.R.S., on "Electrodeless Discharge through Gases," on March 9, at the Imperial College of Science and Technology.

THE College of Physicians of Philadelphia will commemorate on March 22 the tercentenary of William Harvey's discovery of the circulation of the blood. Addresses will be delivered by Sir Humphry Rolleston, of Cambridge, England, and Professor J. J. R. Macleod, of Toronto. There will also be an exhibition of Harveyana.

ON February 29 the central Pennsylvania section of the American Chemical Society celebrated the one hundredth anniversary of the birth of Dr. Evan Pugh, well-known agricultural chemist and the first president of the Pennsylvania State College. Dr. Erwin W. Runkle, college historian, gave the principal address entitled "Evan Pugh—Teacher, Scientist, President."

THE bridge over the Arthur Kill between Elizabeth, N. J., and Howland Hook, S. I., will be named in honor of the late General George W. Goethals, under the terms of a resolution recently passed by the Port of New York Authority.

DR. SAMUEL A. MATTHEWS, professor and head of the department of physiology, therapeutics and pharmacology at Loyola University School of Medicine, Chicago, died on February 19.

DR. M. G. SCHLAPP, professor of neuropathology at the New York Postgraduate Medical School, died on March 5, at the age of fifty-eight years.

DR. ROBERT ABBE, associate in surgery at the College of Physicians and Surgeons, Columbia University, died on March 7, aged seventy-seven years.

PROFESSOR LUDWIG MILCH, director of the Institute of Mineralogy and Petrology at the University of Breslau, died on January 5, aged sixty years.

THE United States Civil Service Commission announces open competitive examinations for the positions of associate aquatic biologist, and assistant aquatic biologist, at entrance salaries of $3,000 and $2,400 per annum, to be held not later than March 27, 1928. Two vacancies in the position of assistant aquatic biologist, for duty at Fairport, Iowa, and Ann Arbor, Mich., and vacancies occurring throughout the United States in these positions or in positions requiring similar qualifications, will be filled from these examinations, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer or promotion. The subjects to be considered are (1) education, training and experience, weight 70; (2) writings (publications or thesis, to be filed with application), weight 30. The ratings on the first subject will be based upon competitors' sworn statements in their applications and upon corroborative evidence.

THE two hundred and twentieth meeting of the Washington Academy of Sciences was held in the auditorium of the National Museum on March 15. The program consisted of a moving picture entitled "Mechanics of the Brain," prepared by Professor Ivan P. Pavlov, director of the physiological laboratories in the Russian Academy of Sciences. The picture presented a series of experiments on children and animals chosen to illustrate the mechanism of

their reactions to various external stimuli. Especial attention is paid to the development of "conditioned reflexes," which has been one of the principal subjects studied by Professor Pavlov and his collaborators. This film was exhibited through the courtesy of the American Society for Cultural Relations with Russia.

A SERIES of four addresses on the general subject "The Measurement of Mankind" is being delivered under the auspices of the Minnesota chapter of the Society of the Sigma Xi. These lectures are as follows: February 16, "The Measurement of Man in the Mass," Professor J. Arthur Harris; March 7, "Body Growth in Infancy and Childhood," Professor R. E. Scammon; March 28, "Normal and Abnormal Human Types," Professor C. M. Jackson, and April 18, "Mental Development in Relation to Physical Development and Types," Professor D. G. Paterson.

DR. JOSEPH EUGENE ROWE, professor and head of the department of mathematics and director of extension in the College of William and Mary, has been granted two sets of letters patent on the trinometer and associated instruments. The first of these consists of nine claims on the trinometer, which is an instrument that makes possible the mechanical solution of triangles and the finding of their areas by simple means. The second patent consists of improvements on the original instrument and extends it to the solution of quadrilaterals and other polygons.

THE polar ship *Morrissey*, with Captain R. A. Bartlett in command, sailed north on March 4 from Balboa, bound for the Aleutian Islands and Northern Siberia, by way of Seattle, to search for post-glacial mummies and explore little-known lands. The *Morrissey* arrived at Balboa from New York on February 29. The present expedition is headed by Dr. Frank Chapman and includes five others.

THE Field Museum of Natural History, in Chicago, has arranged an exhibition showing the results of five recent zoological expeditions. These are the Chicago *Daily News*-Field Museum Abyssinian expedition, the Marshall Field Brazilian expedition, the James Simpson Roosevelt Asiatic expedition, the John Borden-Field Museum Alaska Arctic expedition and the Conover-Everard African expedition.

AT a meeting of the directors of the Guggenheim Medal Fund at the offices of the Guggenheim Foundation for the Promotion of Aviation the following officers were elected: Elmer A. Sperry, *president;* Edward P. Warner, assistant secretary of the Navy in charge of aeronautics, *vice-president,* and Alfred D. Flinn, secretary of the United Engineering Societies, *secretary and treasurer.* The fund was established to award from time to time a gold medal to "that person who performs some notable achievement tending to the advancement of aeronautics." The rules require that the names of the recipients must be under consideration at least a year before the award is made.

A MARINE zoological laboratory and summer camp on the Isles of Shoals will be a project of the department of zoology of the University of New Hampshire this summer, according to Professor C. Lloyd Jackson, head of the department. Full credit at the camp may be received for either graduate or undergraduate work, since, in addition to research work, full courses will be offered in ecology, systematic zoology, comparative anatomy and embryology.

THE National Park Service has announced that the Yosemite School of Field Natural History will open on June 25 for its fourth season, as a summer school for the training of naturalists, nature guides and teachers of natural history. The Yosemite Museum is headquarters for the school. The work was originated by the California Fish and Game Commission and is also participated in by the Yosemite Natural History Association. There are seven members of the staff, including A. F. Hall, chief naturalist; C. P. Russell, park naturalist, and H. C. Bryant, director of the school and nature guide.

A GIFT of $5,000,000 has been made from the Laura Spelman Rockefeller Memorial to the Great Smoky Mountain National Park fund. The sum of $4,913,000 has already been raised by subscription and by appropriations of the North Carolina and Tennessee legislatures. The Rockefeller gift brings the total almost to $10,000,000, which, it is believed, is more than enough to purchase the land for the park. The park will lie partly in Tennessee and partly in North Carolina. It will be some 700 square miles in area and will take in almost all the Smoky Mountain territory.

THE State of Rio de Janeiro, Brazil, has announced the offer of a prize of approximately $1,200 to a scientific man, either Brazilian or foreign, who prior to December 31, 1928, determines in an accurate and scientific manner the etiology of sugar cane mosaic and an effective method of combatting it, and presents the best thesis on this subject, this thesis to be published for the use of the public. Further information can be had from Dr. Enrico Teixeira Leite, director, Instituto Fomento e Economia Agricola, Ministerio da Agriculture, Rio de Janeiro, Brazil.

ACCORDING to the *Journal* of the American Medical Association a bill, authorizing the maintenance of the Gorgas Memorial Laboratory on the Isthmus of Panama and providing that $50,000 annually be paid to the Gorgas Memorial Institute of Tropical and

Preventive Medicine, Inc., for the operation of the laboratory, has been approved by the committee on foreign affairs of the House of Representatives on condition that it be constructed within five years; that each of the Latin American governments be invited to contribute annually toward its maintenance, and that the United States be represented permanently on the board directing the administration of the laboratory, while the Latin American governments contributing have the privilege of being represented on the board.

CREATION of the "Textile Alliance Foundation" to administer a fund of approximately $1,500,000, accumulated during the world war, for educational research in the development of the textile industry, would be provided in a bill introduced by Representative Merritt, of Stamford, Conn. The bill was referred to the house committee on interstate and foreign commerce.

THE valuable collections of fungi collected by the late Curtis G. Lloyd, who died a year ago, will probably go to the Smithsonian Institution, because the trustees in Cincinnati are unable to properly care for it. The Central Trust Company has filed suit to end its trusteeship and obtain authorization to give the Lloyd collection to the institution.

DR. WILLARD ROUSE JILLSON, state geologist of Kentucky, announces the passage through the legislature and approval by the governor of Kentucky of an emergency appropriation bill of $34,000. This sum is immediately available for all general administrative purposes of the Kentucky Geological Survey. The annual appropriation of the Kentucky Geological Survey is $90,000, to which sum this appropriation has been added this year.

UNDER the will of the late Dr. W. Gilman Thompson, a former president of the New York Botanical Garden, the garden is to receive the sum of $5,000.

ANNOUNCEMENT is made that subscriptions to the Charles Sprague Sargent Fund for the endowment of the Arnold Arboretum now amount to $793,307, or nearly three fourths of the $1,000,000 goal.

THE United States Shellac Importers' Association has founded a research fellowship in shellac, known as the Shellac Research Bureau, at the Brooklyn Polytechnic Institute. The work is to be done under the direction of J. C. Olsen and W. F. Whitmore.

OXFORD UNIVERSITY has authorized the expenditure from the government grant of a sum not exceeding £2,800 on an addition to the department of chemistry at the University Museum so as to provide an additional workshop on the ground floor and a research laboratory on the first floor.

DR. R. M. APPERT, who recently died at San Remo at the age of sixty-five years, has bequeathed the Pasteur Institute of Paris a sum of 2,000,000 francs.

ANOTHER addition to the University of Chicago's medical center on the Midway has been made public by President Max Mason, who announced that an arrangement had been made by which the Home for Destitute Crippled Children will transfer its main hospital to the south side, where new buildings providing one hundred beds will be in operation by the summer of 1929 as one of the series of university clinics. A part of the program is made possible through a gift to the home of $300,000 by Mrs. Elizabeth S. McElwee for the erection and equipment of one of the buildings. Another gift of $300,000, made by Mrs. Gertrude Dunn Hicks to the university last September for an orthopedic hospital, is to be used for the erection of the other division of the building to house the home.

A SPECIAL clinic and laboratory has been opened by New York University at the new Sydenham Hospital. The clinic is designed to study exclusively cases of asthma, eczema, hives, hay fever and other allergic diseases of children from infancy up to puberty. It was made possible by the gift of $30,000 by a friend of the university. Adequate hospital and laboratory facilities have been arranged for an intensive study of these diseases. Dr. Bret Ratner, of the New York University and Bellevue Hospital Medical College staff, who will direct the work of the clinic, began his investigations several years ago in the physiology department of the late Professor Holmes C. Jackson when an initial gift of $15,000 for research in this field was given the university by the same donor. The experimental work involving tests on animals will continue to be done in the university laboratories. The clinic which will be open for patients immediately will be under Dr. Ratner and a special staff.

THE medical school of Stanford University has received $500 from Mr. Edward M. Mills for free beds for children; $1,000 from Miss Helen E. Cowell for physiotherapy treatments for indigent deserving patients; $100 from a grateful patient to be used for surgical research; $610.69 from the estate of Mrs. Ann Whitney Sperry to be used for the benefit of Protestant and Catholic crippled or orphaned children of San Francisco; $2,500 from Mr. Roy N. Bishop, and $500 from Mr. George T. Cameron as contributions to the Wellington Gregg Fund for the study of nephritis. Pediatrics, which so far has been a division of the department of internal medicine, has been made a full department in the medical school.

A RESEARCH institute for psychiatry, consisting of serological, genealogical, chemical, histological, anatomical and psychological departments, for which the

funds have been provided by the Rockefeller Foundation, will be opened at Munich next May.

Nature states that it has been decided to found an institute at Prague for the scientific investigation of coal. It will have the support of the state and of the various coal undertakings in Czechoslovakia.

AN anonymous donor has presented to Cornell University five hundred acres of abandoned farm land in Newfield, which will be used for experiments and instruction in forestry and as an observation ground for botanists.

AN archeological expedition sponsored by Captain Marshall Field has gone to British Honduras to seek new facts concerning the ancient culture of the Mayas and to collect material illustrating their civilization for exhibition in the Field Museum of Natural History. The expedition has for its leader J. Eric Thompson, assistant curator of Mexican and South American archeology at the museum. Its center of operations will be Belize.

WITH all construction details completed and with a large stock of rabbits on hand, the rabbit experiment station maintained by the division of fur resources of the U. S. Bureau of Biological Survey in cooperation with the National Rabbit Federation and local rabbit breeders at Fontana, California, was formally opened on March 3. The chief of the biological survey, Paul G. Redington, represented the U. S. Department of Agriculture. The station will be under the directorship of D. Monroe Green, formerly of the Washington office of the U. S. Biological Survey, who went to Fontana several months ago to take charge of the erection of the station. Assisting Mr. Green will be John W. Meyer, formerly of the office of exhibits of the Department of Agriculture.

UNIVERSITY AND EDUCATIONAL NOTES

DR. HARVEY NATHANIEL DAVIS, professor of mechanical engineering at Harvard University, has been chosen president of the Stevens Institute of Technology at Hoboken, N. J. Dr. Davis takes office on September 1, succeeding the late Dr. Alexander C. Humphrey.

DR. EDWARD HICKS HUME, formerly president of the Colleges of Yale-in-China, has been appointed director of the New York Post-Graduate Medical School and Hospital, and not of the Yale Graduate School as was erroneously reported in the last issue of SCIENCE.

DR. HARRY CLARK, of the biophysics division of the Rockefeller Institute for Medical Research, has been appointed acting professor of physics for the summer session at Leland Stanford University.

DR. JOSEPH T. WEARN has been promoted to be associate professor of medicine at Harvard University.

DR. CHARLES HUNTER has been appointed professor of medicine at the University of Manitoba, to succeed Dr. Edward W. Montgomery, now minister of public welfare of Manitoba.

PROFESSOR J. H. DIBLE, professor of pathology in the University of London and honorary pathologist to the Royal Free Hospital, has been appointed to the chair of pathology in the Welsh National School of Medicine in succession to Professor E. H. Kettle.

THE first professorship of the geology of fuel (petroleum and coal) at a German technical school has been created at Freiberg in Saxony. The occupant is to be Dr. Otto Stutzer, who has also been elected director of the new fuel institute at the School of Mines.

PROFESSOR ROBERT KÖNIG, of the University of Münster, has been appointed professor of mathematics at the University of Jena.

DISCUSSION AND CORRESPONDENCE

THE FUNCTIONAL NATURE OF THE CONSTANT OF MASS ACTION

THE thermodynamical proof given by van't Hoff that the constant of mass action is a constant at constant temperature depends on the tacit assumption that molecules while getting transferred from one chamber to another in a certain isothermal process do not decompose. This is a difficulty in the process which has been recognized, but is usually ignored. Attempts have been made to overcome it by supposing that either, (a) the molecules are so rapidly transferred that they have not time to decompose, or (b) decomposition is prevented by a catalytic agent. But (a) does not give an isothermal process, and (b) would radically change the nature of the molecules. The writer has shown in a paper that will appear shortly in the *Philosophical Magazine*, that if all the thermodynamical conditions of equilibrium are satisfied, the constant of mass action can be shown to be a function of the volume of the interacting gas, the masses of the constituents, as well as of the temperature. It may of course be in most cases *approximately* independent of all variables except the temperature.

If this result is true, we should expect that thermodynamical differential equations exist which determine the functional nature of the constant of mass action. These the writer has obtained and will be given in a subsequent paper. They are evidence of the truth of the result obtained; additional evidence presents itself from many directions which can not be dealt with here.

From kinetic considerations we would also expect this result to hold. The number of molecules ae that

are formed per second from molecules *a* and e in a gas is usually written $k_1C_aC_e$, where C_a and C_e denote the concentrations of the molecules *a* and e, respectively, and k_1 the chance of a molecule *a* encountering a molecule e in a second. But what happens during an encounter most likely depends on the state of the molecules, which would depend on previous encounters with other molecules, during which they get activated so to speak, or we should write $\varkappa_1 k_1 C_a C_e$ for the number of molecules formed, where $\varkappa_1$ may be called the activation constant, and is the fraction of the encounters at which the molecules were sufficiently activated to form new molecules. Similarly the number of molecules ae breaking up per second is usually written k_2C_{ae}, where C_{ae} denotes the concentration of the molecules ae, and k_2 the chance of a molecule breaking up during a second if left to itself. But this chance may depend on previous encounters with other molecules, or we should write $\varkappa_2 k_2 C_{ae}$ for the number breaking up per second, where $\varkappa_2$ denotes the activation constant. When equilibrium exists

$$\varkappa_2 k_2 C_{ae} = \varkappa_1 k_1 C_a C_e$$

and hence

$$K = \frac{\varkappa_2 k_2}{\varkappa_1 k_1}$$

The quantities k_1 and k_2 depend on the temperature only. Hence unless $\varkappa_2 = \varkappa_1$ the constant of mass action is a function of the volume of the interacting mixture and masses of the constituents, since $\varkappa_1$ and $\varkappa_2$ are functions of these quantities, besides of the temperature.

R. D. KLEEMAN

SCHENECTADY, N. Y.

VEGETATIVE PROPAGATION OF THE APPLE BY SEED

IN a recent article[1] dealing primarily with chromosome studies, Kobel, of the Swiss Versuchsanstalt für Obst-, Wein- und Gartenbau (Wädenswil), has reported several instances of apparent apogamy in the apple. Using the variety known there as Transparent de Croncels (but which may possibly be Yellow Transparent), several emasculated and bagged flowers have in different years set seeds, some of which have been cytologically examined at various stages of development, while others of these seeds have been grown to bearing trees. The writer of this note saw on the Wädenswil experimental grounds, the 4 seedlings which are now in bearing; their apparent identity with the seed-mother tree, together with the results of Dr. Kobel's cytological studies seem to warrant the conclusion that under certain conditions (not as yet defined), unfertilized ovules of this variety may set viable seeds, genetically constituting true vegetative reproduction. These results differ from the somewhat similar observations by Frost,[2] in that in Citrus the stimulus proceeding from fertilization seems necessary for the production of such "asexual" seeds, while in the apple they may arise entirely without fertilization.

As Kobel points out, the importance of such apogamic seeds as a means of obtaining uniform, clonal rootstocks, should be at once apparent. Although under the conditions of his experiments, Kobel was not able to get a high enough percentage of such "asexual" seeds to make them a factor in the production of uniform rootstocks, still his results point very strongly toward the desirability of carrying out extensive emasculation and bagging experiments with as many different varieties of apples and under as many different conditions as possible, with the expectation that the proper combination of varietal and environmental conditions will be found which will make such "vegetative propagation by seed" feasible.

CHARLES F. SWINGLE,

National Research Council Fellow in Botany.

THE UNIVERSITY

LEEDS, ENGLAND

LIVING CELLS IN HEART-WOOD OF TREES

IN a special article entitled "Long-lived Cells of the Redwood," published in SCIENCE of November 11, 1927, D. T. MacDougal and G. M. Smith state that "We can not find any definite statement of living cells in heartwood," and conclude that the facts they present in connection with their study of redwood "seem to constitute the first announcement of living cells in heartwood."

They have evidently overlooked a paper by J. H. White, "On the Biology of Fomes applanatus (Pers.) Wallr." published in the *Transactions* of the Royal Canadian Institute, pages 133–174 of Vol. XII, 1919. Dr. White described the path of entrance of the fungus into the heartwood, and then the character of the changes induced. "A study of the living wood of trees attacked by *F. applanatus* shows, as I have already indicated, a feature not found in dead wood. I refer to a brownish discolored zone which marks the extreme limit of advance of the fungus," (p. 155). Within this band there were found deposits of wound gum, but more striking still "Tyloses constitute another remarkable feature of the brown zone." "I have found them in attacked sapwood and heartwood of several species in which search was made for them, including beech, sugar maple, and red oak." Convincing demonstration is especially easy in red oak.

[1] Zytologische Untersuchungen an Prunoideen u. Pomoideen. *Archiv Julius Klaus-Stiftung f. Vererb., Soz., u. Rassenhygiene.* 3(1): 1–84. 1927. Zürich.

[2] Polyembryony, heterozygosis and chimeras in Citrus. *Hilgardia.* 1(16): 365–402. 1926.

These do not occur similarly in adjacent sound wood. There had been such a prevalent opinion among athologists that heart-rotting fungi are not truly arasitic, because of the commonly accepted assumption that the heartwood is dead, that White took pains o show that such views were erroneous. After discussing evidence to be drawn from the "wound gum," e continues, "Tyloses fortunately do not suffer such ariant opinions; they can be produced only by living ells. Their occurrence, then, proves that the invaded issues are living . . . The tyloses arise as the result f a stimulation primarily induced by the fungus." (p. 163.)

J. H. FAULL

DEPARTMENT OF BOTANY,
UNIVERSITY OF TORONTO

A PREHISTORY CHART

Professor A. E. Jenks, of the Department of Anthropology at the University of Minnesota, has designed a chart illustrative of the chronological sequences of archeological periods in prehistoric Europe and of typical artifacts of each period. The dimensions of this chart are three feet by four feet. The upper half is devoted to a chronological diagram of culture sequences in which the various glacial advances are represented by peaks and the interglacial periods by valleys. The associated cultures are distinguished by the varied colors of the different portions of this Pleistocene range. The several types of fossil man have their positions in the landscape indicated by guide posts.

The lower half of the chart shows drawings of characteristic implements of the successive periods, excellently delineated and clearly labelled. The selection of artifacts representative of the Paleolithic periods is very good. Limitations of space prevent an equally satisfactory display of objects characteristic of the Neolithic, Bronze, and Early Iron Ages. Nearly all of those represented on the chart come from the Scandinavian area. But the author has chosen carefully and well.

Teachers of history and of prehistoric archeology will find that Professor Jenks' chart is a valuable aid to themselves and to their students. Ten minutes' study of this chart will fix in the mind of the reader facts which ordinarily require for their absorption hours of concentration and much thumbing of leaves of text-books.

E. A. HOOTON

HARVARD UNIVERSITY

PHILOSOPHY OR IRONY, WHICH?

IN the current number of SCIENCE, January 13, I read Dr. Stetson's short, but appreciative, review of Professor Eddington's "Stars and Atoms" and noted what the reviewer says of the author's sense of humor. However, there is one sentence in particular in which the humor is so "dry" that the casual reader may be led to draw the erroneous conclusion that Professor Eddington endorses the views expressed in the first two paragraphs of Bertrand Russell's "What I Believe." These two paragraphs are sufficient to convince the reader that the author finds his *Ultima Thule* in the electron.

There is nothing in the context leading to the sentence referred to above—nothing but the absurdity of the conclusion itself—that would lead one to regard the sentence as ironical; but I take it, in reality, to be a "sly dig" at Russell and his school. After showing the possible complexities to be expected under conditions due to terrestrial temperatures compared with the simple structures found associated with the high stellar temperatures, Professor Eddington concludes, p. 84:

> Our earth is one of those chilly places and here the strangest complications can arise. Perhaps strangest of all, some of these complications can meet together and speculate on the significance of the whole scheme.

My reason for regarding the above excerpt as ironical may be best expressed in Professor Eddington's own words as given in "Science, Religion and Reality," p. 214.

> Is the motion of the editor's pencil to grammatically amend the split infinitive in this sentence simply the automatic response under physical laws of a complicated configuration of electrons to the external stimulus of this smear of ink on paper? Such an extravagant hypothesis might conceivably appeal to the crude materialist who supposes that the world of electrons is the fundamental reality.

Verbum sap.

M. M. GARVER

THE SOUTH AFRICAN STATION OF THE HARVARD OBSERVATORY

A NOTICE in SCIENCE, January 20, 1928, on the new South African station of the Harvard Observatory was taken indirectly from an unedited article in a student publication; it contains several mistakes and extravagant statements, three of which perhaps justify correction.

1. Mazel's Poort where the Harvard station is located is not a city; it is the water works station of the city of Bloemfontein. The new road and other assistance are being provided by Bloemfontein.

2. The Harvard Observatory is constructing one 60-inch telescope, not three, for the southern station.

3. Mr. W. F. H. Waterfield leaves Cambridge for

Bloemfontein in the near future to act as assistant to Dr. Paraskevopoulos, the superintendent of the southern station.

HARLOW SHAPLEY

APPARATUS

WHILE we are polishing up our pronunciation of scientific terms why not smother the "rat" so frequently heard in ap pa "rā′" tus?

WILMER SOUDER

SCIENTIFIC BOOKS

Climate through the ages: A study of the climatic factors and their variations. By C. E. P. BROOKS. 439 pp., 39 figs. London: Ernest Benn.

THERE are two principal difficulties in the way of a satisfactory explanation of the great climatic changes of geologic time. In the first place, the problem is both meteorological and geological, and requires a command of both of these fields which is practically beyond the power of either the meteorologist or the geologist alone. Secondly, it necessarily rests upon a fragmentary and uncertain knowledge of past conditions, both of climate and physiography, which is often interpreted in very diverse ways by different students of the subject.

Both of these difficulties are illustrated in the latest excursion into the field by the distinguished British meteorologist, C. E. P. Brooks. Nevertheless, his book is one of the most valuable contributions to the problem that has yet appeared. Perhaps its most praiseworthy feature is its emphasis on the quantitative point of view, in contrast to the glittering generalities so prevalent in discussions of paleoclimatology. Even though this does in some cases result in an impression of mathematical exactness hardly warranted by the accuracy of the data involved, it certainly is a step in the right direction.

The book is divided into three parts, the first and longest being a discussion of "Climatic Factors and their Variation," the second dealing with geological climates and their causes, and the third with the climates of the historical past. Climates are broadly classified as "glacial" and "non-glacial," the distinction being based on the presence or absence of a polar ice-cap. It is clearly demonstrated that this factor is of paramount importance in determining the climate of a given period, and hence the classification into "glacial" and "non-glacial" climates is fully justified.

The discussion of the "critical temperature" which determines the expansion of a small winter-formed polar ice-cap into an ice sheet of continental dimensions is highly significant, and should be read by every student of climatic changes. It is shown that a very small fall of temperature—not more than 0.6° F.—may, under proper conditions, produce an ultimate lowering of winter temperature by about 45° F. The importance of this fact in the problem of Ice Ages is evident.

Wegener's hypothesis of continental drift is given considerable attention from a climatic point of view, the conclusion being that it is not necessary to explain even the low-latitude glaciation of Upper Carboniferous time, which Brooks accounts for by purely geographic factors. In spite of some very questionable assumptions, such as the figures for mean cloudiness and amount of solar radiation reflected from cloud surfaces, both of which are based on data applying to special cases, the argument is a strong one.

This dominance of geographic factors is the general theme of the book. While all climatic factors are recognized, and particular significance is given to volcanic dust and solar variations in special cases, the changing relations of land and sea, and the elevation of mountain ranges, with their resultant effects on winds and ocean currents, are shown as capable of bringing about even the major climatic fluctuations of geologic time. No resort to astronomic causes or to special hypotheses is necessary. In the case of historical changes of climate, which Brooks considers to be fully established, solar influences are given a prominent part.

The book is not without serious faults. It shows evidences of hasty and careless writing and insufficient proof-reading. The discussion on p. 75 is a hodge-podge of blunders, in which the direction of winds around a center of high pressure in the northern hemisphere and the direction of the Equatorial Current are both given incorrectly. The reason given on p. 182 for the vertical decrease of temperature gradient is also incorrect. No authority is quoted for the statements on pages 162 and 163 regarding the percentage of water in the Gulf Stream which reaches the Arctic Ocean and the melting of the ice floor in Spitzbergen about 3000 B. C. The figures on p. 166 and the diagram on p. 167 to which they refer are both wrong, leading to much confusion. On p. 210 "windward" is used where "leeward" is meant. Other mistakes and omissions occur all too frequently.

Geologists will take exception to many statements in the book. Some of these, like that on p. 128, where the area of the Pleistocene ice-sheets is given as 1,000,000 sq. miles greater than the present area, are inexcusable. It is far from true that "the accession of salt to the oceans is at present derived almost entirely from sedimentary rocks" (p. 93). Nor is there any adequate basis for asserting that deserts were extensively developed in southeastern United States during the Mesozoic (p. 273). The reference is presumably to the areas of Newark rocks, which

o not extend south of North Carolina and do not epresent true desert conditions. The more southerly f these areas indicate distinctly less arid climates han those farther north, and even contain appreciable uantities of coal, which Brooks interprets as a roduct of equatorial rain forests.

It is perhaps too much to expect a meteorologist o be fully qualified to deal with purely geological uestions, but when he ventures into a field in which eology plays almost as important a part as meteorol-gy, the active collaboration of a geologist of recog-ized standing would appear to be a highly desirable afeguard. It would at least prevent such violence o terminology as the indiscriminate use of the word period" to describe any and all intervals of geologic ime, from "Mesozoic period" to "Pliocene period."

Although marred by too frequent errors such as hose mentioned, the book is nevertheless a remark-ble and highly valuable work. A prodigious amount f labor has gone into its preparation. It is to be oped that it will have a salutary effect on those who ee in new and fantastic hypotheses the only solution o the problem of geologic climates.

MALCOLM H. BISSELL
CLARK UNIVERSITY

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A METHOD FOR CUTTING GLASS TUBING

READING the note by Herman E. Seemann on a "Method for Cutting Glass Tubing," SCIENCE No. 1726, I have remembered a method used to the same effect at laboratories of the University of St. Petersburg, Russia.

By means of a fine triangular file a circular furrow used to be made around a tube and then a melted glass stick applied to the cut in such a way as to press melted glass into the furrow. Usually the tubing cracked immediately and very regularly following the direction of the cut. Rather seldom it was necessary to apply melted glass repeatedly. The method, so far I am able to remember now, never failed and gave everybody a complete satisfaction. Especially it was used to open heavy glass tubings containing some preparation for analysis, for example, minerals or rocks under great pressure heated for a number of hours with sulfuric acid in a closed tubing. Any other method of cutting, for example, the one offered by Hermann E. Seemann, might not be applied in this case.

A furrow might be rather shallow, about a half of a millimeter was found quite sufficient, but has to be made accurately without lateral incisions even short ones. The whole operation, including the making a furrow, used to take less than a half of an hour even in the case of heavy tubing of a large diameter.

I. P. TOLMACHOFF
CARNEGIE MUSEUM,
PITTSBURGH, PENNSYLVANIA

A PLATINUM SPOON FOR ISOLATING AND TRANSFERRING PROTOZOA

IT is often desirable in investigations on protozoa, especially in those concerning life-histories, to secure the animals free from other organisms and detritus. The use of the capillary pipette in isolating organisms is very satisfactory in most cases if the animals are sufficiently washed. The author has experienced considerable trouble in washing to eliminate all other organisms. In an attempt to obviate this difficulty he has found that if only a few specimens are required, the instrument described below (Fig. 1) has some advantages over the pipette.

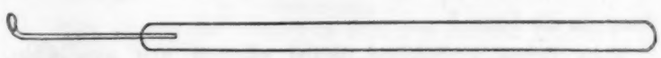

FIG. 1

The tip of an ordinary platinum bacteriological needle is flattened so as to form a circular disk about .2 mm. thick and .5 mm. to 1 mm. in diameter according to the needs. The surfaces and edges are then smoothed off so that the animal will not be injured. With a stylus or some other blunt instrument a depression is made in one of the flat surfaces of this disk forming a concavity, holding just enough water to cover the individual to be isolated.

The spoon is used as follows: A specimen desired for isolation is selected and if lying on the bottom of the dish, the instrument is lightly passed beneath it, then with a jerk it is brought to the surface by the currents produced; the spoon is now placed directly under the individual and gently raised through the surface film. In this way one can transfer active as well as sluggish animals, *e.g.*, didinia, paramecia, amoebae, etc. With a little practice specimens as small as 150 micra can be isolated under the low and high powers of the microscope.

The use of the instrument has the following advantages: It can be easily and thoroughly sterilized, a thing which is often desirable in protozoan studies; it is not fragile, an item of considerable importance as a labor saving device; and lastly, such minute quantities of fluid are transferred with the animals that the effect of it on the new solution becomes negligible after a few transfers and the possibility of contamination less.

PERCY L. JOHNSON
THE JOHNS HOPKINS UNIVERSITY

SPECIAL ARTICLES

STATISTICS OF VOCABULARY

WHILE studying some data on the relative frequency of use of different words in the English language, I noticed a rather interesting functional relationship which is here communicated. The note which follows, admittedly incomplete, is published in this form because the subject is one which I can not pursue and which may be of interest to those who are actively engaged in the study of language.

Suppose one takes a large representative sample of written English, counts the number of times each word appears and arranges the words in order of decreasing frequency of occurrence. The n^{th} word in such a list will then occur with an observed frequency which is a function of n, call it f(n). This function is clearly a monotonicly decreasing function of n, from the way the data have been arranged. But what is its form?

Two large published word counts are available. One is that of L. P. Ayres, "A Measuring Scale for Ability in Spelling," Russell Sage Foundation, 1915, and the other is that of G. Dewey, "Relativ Frequency of English Speech Sounds," Harvard University Press, 1923. Each of these writers analyzed samples of 100,000 words of written English.

In the accompanying figure is plotted the logarithm of the observed frequency of the n^{th} word against the

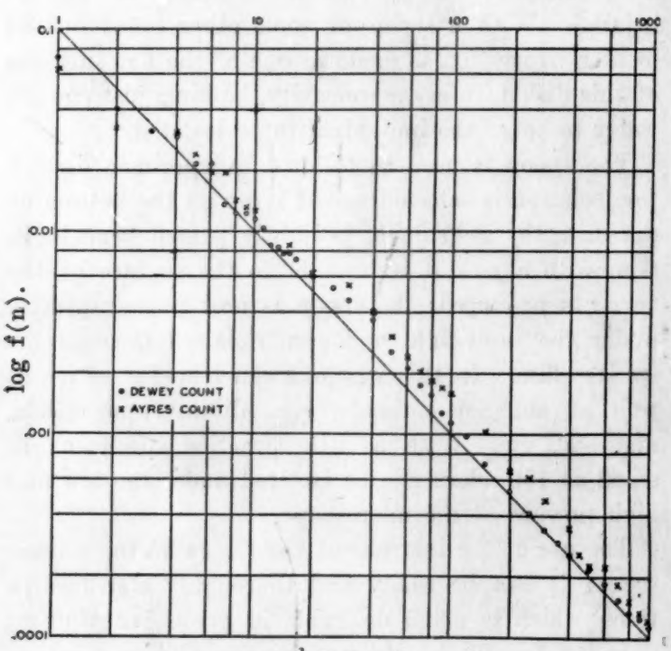

FIG. 1

logarithm of n. The circles are based on Dewey's count while the crosses are based on that of Ayres. The close approximation of the points to a straight line with unit negative slope is at once remarked. This suggests that there is something about the way in which man uses his language (Is the relation true for other languages?) which makes the frequency of occurrence of the n^{th} word be given by a formula of the form,

$$f(n) = \frac{k}{n}$$

On this form some comments will be made at the close of this letter. An interesting question concerns the value of the constant, k. Supposing the law to be valid over the entire range of the language, k must have such a value that the result of summation over all the different words in the sample will equal unity. That is, k is determined by the equation,

$$k \sum_{n=1}^{m} \frac{1}{n} = 1.$$

Since for large values of m (the number of different words in the sample) the summation can be replaced by $\lambda + \log_e m$, where $\lambda = 0.5772$, is Euler's constant and the logarithm is to the natural base, one has a ready means of computing the value of k from the total number of different words in the sample. Dewey found 10,161 different words in his sample, accordingly the value of k is 0.102.

A sort of check on the accuracy of this representation is given by assuming that the most infrequent word occurred just once and inferring from that fact and the value of k the total size of the sample. The value would clearly be 10,161 divided by k, or 99,500, which checks well with the actual size of sample counted, *i.e.*, 100,000.

On the figure the solid line has been drawn to represent the function with $k = 0.100$. It is seen to fit the data quite well, although there are systematic deviations.

Supposing the law to be substantially correct, the writer ventures to point out that it is perhaps a quantitative appearance in language of the Weber-Fechner law of psychology. In the language of the economist, it is a quantitative law of diminishing utility in vocabulary. The frequency of use of a word measures in some way its usefulness in transmitting ideas between individuals. Considering a vocabulary of n words it appears that the marginal increase in idea-transmitting power which can be accomplished by the addition of another word to the vocabulary is smaller the greater the value of n, according to the same law which governs the relation between the psychological increase in sensation accompanying an increase in the total intensity of the physical stimulus.

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SCIENCE NEWS

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PHOTOGRAPHS OF THE SUN'S CORONA

LONG and expensive expeditions of astronomers to distant parts of the earth to photograph the fleeting phenomena of a total eclipse of the sun may be avoided in the future. The sun's corona, the outer layer of which until now has only been observable when the moon obscures the bright solar disc, has been photographed in full daylight by Dr. G. Blunck, the German astronomer.

In the past many experiments have been made by astronomers to achieve the photography of the corona without waiting for an eclipse, but they have all failed. For ordinary colors, the brightness of the corona is just about the same as that of the sky itself around the sun, so that photographs can not show where one stops and the other begins. The sky itself gives off light largely of blue and the shorter, invisible, ultra-violet, while a large part of the corona's light is in the red, and the longer wave, invisible, infra-red. Accordingly, efforts have been made to take the corona's picture with red, or infra-red, light. So far, these have also been unsuccessful.

Dr. Blunck explains that the reason for these failures is that the previous experiments have been made with rays that were not long enough. For a wave-length of 7,000, which is in the visible red part of the spectrum, the corona is only eight tenths of a per cent. brighter than the sky. This is scarcely enough difference to permit a good picture. However, for infra-red light of 8,500, the corona is 1.7 per cent. brighter than the sky, while at 9,500, it is 2.5 per cent. brighter, which should be enough difference to permit a photograph to be made.

The difficulty comes in securing photographic plates sensitive to these longer waves. Ordinary plates are most sensitive to the blue, hence they are developd in red light. Special plates sensitized before use by immersion in a dye called neocyanin are most sensitive to light of wavelength of 8,000. Dr. Blunck tells of a new dye, called procyanol, that he has used, with which the plates can be sensitized to light at 8,500, and it is with these plates that his efforts have been successful.

Photographs made last year by Dr. Blunck show details that make them appear to be of the actual corona. As a test of his method, however, it has been suggested that the method might be tried at a partial eclipse of the sun, while the moon obscures part of the sun, and part of the corona. If Dr. Blunck's method is really successful, then he should obtain on his plates the outline of the moon, even where it is not in front of the actual solar disc.

THE EFFECTS OF SUNSPOTS ON RADIO

FUTURE radio engineers may be able to look at the sun through a telescope and then tell how the presence or absence of spots will affect the transmission of radio waves as a result of an investigation now under way, at Cambridge, Mass., with the cooperation of physicists and astronomers.

There has just been installed in the Harvard Astronomical Laboratory, under the direction of Dr. Harl T. Stetson, professor of astronomy, apparatus to stu the relation of spots and radio. Greenleaf W. Picka Boston radio engineer, designed the apparatus, and i stalled it for use in cooperation with studies that he h been carrying on for several years. Each day the s is photographed to give the size and number of spots.

It is not yet possible to say whether or not combinati of radio data, with observation of the sun, can ever b used to predict earthly weather conditions. Howeve according to Dr. Stetson, observations are beginning t make us feel confident that there is a direct connecti between conditions in the solar atmosphere and certa atmospheric disturbances on the earth. It seems n unlikely that with the further study of the bearing o sun-spots upon radio reception it will be possible to mak allowances for the solar disturbances and by so doing dis cover more closely than ever before the correlation o radio reception with temperature, pressure and oth meteorological phenomena.

Just what happens on the earth when a sun-spot ap pears on the side of the sun towards us is not fully known It is believed that electrified particles discharged from th disturbed region on the sun, hurling through space, bom bard the upper atmosphere of the earth and are re sponsible for an increased ionization of the latter whic is responsible for the modification of the intensity of th radio waves.

The station from which the signals will be sent, whic are measured at the Harvard Laboratory, is WBBM, Chi cago. The apparatus, which automatically records signa strength, as received in Cambridge, is carefully calibrate each day and makes it possible to record the measure ment in absolute units of electrical intensity.

Dr. Stetson explained the apparatus was so designed that it would measure the intensity of the carrier wav and would scarcely be affected at all by superimpose modulations caused by the broadcasting of music.

3,600,000 VOLTS OF ELECTRICITY

THREE million, six hundred thousand volts of electricity can now be stored in artificial "clouds" and discharged in a ten millionth of a second, thus imitating in the laboratory the effects of lightning more accurately than ever before. This feat has been accomplished at the laboratory of the General Electric Company, at Pittsfield Mass., by F. W. Peek, Jr., who spoke before the recent regional convention of the American Institute of Electrical Engineers at St. Louis. Such a voltage is seventeen times as great as that carried over even the highest voltage power lines.

As these sparks last but a ten millionth of a second and as light travels about 100 feet in that time, the blind ing flash is all over when seen by a person only a hundred feet away. Yet the flash appears to be there when he sees it!

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This manual is for use in laboratory courses in general biology. It is not intended to take the place of a text-book of biology or of lectures, but to aid both the teacher and student in the practical work of the class.

The Oxford University Press, American Branch, New York

FOOD AND HEALTH. A. Barbara Callow. pp. 8 + 96. Illustrated. $1.00.

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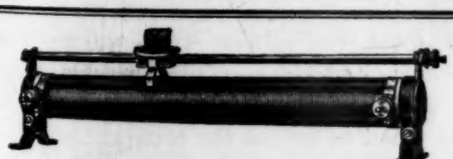

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Although these voltages frequently have a duration of less than a millionth of a second their rate of rise and fall or wave shape has been accurately measured by an instrument using a beam of electrons as a pointer and known as a cathode ray oscillograph.

The object of the study is to secure scientific information on the nature of electricity and to obtain further engineering information on the protection of life and property against lightning, to build transmission lines, transformers and other electrical apparatus to resist lightning voltages. Lightning is one of the greatest foes to electrical apparatus and much has already been done in this laboratory to produce lightning-proof apparatus. The present generator produces higher voltages than ever produced by natural lightning on transmission lines.

THE OX5 AIRPLANE ENGINE

To those in aviation OX5 means the Curtiss water-cooled 90-horsepower engine that has powered so many airplanes in the decade since the war. Last year during the boom in aircraft production that accompanied the extraordinary development of airways, flying fields and aviation exploits, 65 per cent. of the estimated 1,653 airplanes produced for commercial use were powered by OX5 engines.

For the OX5 was the airplane engine produced in quantity for war use. Probably no other airplane engine has had such quantity production. Some 17,000 were in storage at the end of the war. They were sold cheap, cheaper than they can now be produced to-day. And that is the secret of airplanes being quoted on the market at the cost of a medium-priced automobile. You can buy an airplane, f.o.b. the flying field, for as little as $2,500.

The supply is about exhausted. Airplane manufacturers estimate that the last of the easily available, cheap OX5's will be installed in airplanes to be built by the end of this month (March). The threatened engine shortage may have a tendency to slow down the booming airplane production that has been stimulated by the quickening aviation interest in this country. One manufacturer last year produced more than one airplane per working day of one OX5-engined type alone, and the production possibilities of this plant are now said to be as high as eight airplanes a day. Several other manufacturers are contemplating large-scale production.

Realizing the need of a cheap and reliable engine to take the place of the OX5, several engine manufacturers are producing experimentally on a small scale low-powered motors, most of them air-cooled. Nine established engine manufacturers are producing in this country, but many of them are occupied with the production of the larger engines for transport, mail and military airplanes and have not yet entered the low-price field. Some see in the Ford aircraft activities a promising future source of inexpensive engines for the aircraft that Americans are beginning to demand in much the same spirit that they bought automobiles in the early years of the century.

THE ANTARCTIC ICE

ANTARCTICA, whose desolate ice fields will soon re-echo the roar of Commander Byrd's motors, has enough ice to cover the whole earth to a depth of 120 or [illegible] feet, and has been gathering this vast store of solidified cold for a quarter of a million years or more.

This is the opinion of Professor W. Meinardus, of the University of Göttingen, who has been engaged lately in an endeavor to estimate the bulk of the ice that covers the south polar continent. He is of the opinion that only a small part of the elevations of from 6,000 to 10,000 feet reported for the surface of the Antarctic plateau are be made up of solid land. Most of the mass, he thinks, consists of accumulated ice, piled on a foundation of rock not more than about 2,000 feet in mean elevation. Professor Meinardus derives this estimated land height of Antarctica from an average of the mean elevation of the nearest continents, South America, Africa and Australia. Everything above that is ice.

Multiplying the estimated average thickness of the massive sheet by the area of Antarctica, Professor Meinardus obtains a total of twenty-six quadrillion (26,000,000,000,000,000) cubic yards of ice, weighing about twenty quadrillion tons. There is enough ice there, he says, to cover all Europe to a depth of over 6,500 feet, or to blanket the whole earth under a layer between 120 and 130 feet thick. Melted down, it would raise the world's general ocean level approximately 100 feet.

From the slowness of glacial movements in the Antarctic region, Professor Meinardus has come to the conclusion that at least part of the southern ice mass has been there since Pleistocene geological times. This is variously estimated at from 250,000 to 400,000 years ago, so that the ice of Antarctica has been in cold storage at least a quarter of a million years.

THE CORN BORER IN RUSSIA

THE European corn borer, on which the United States is now waging costly war, is an old and troublesome story in Russia. It is a pest throughout the southern half of European Russia, and occurs in less destructive numbers in an additional stretch of territory to the north. Its northernmost extension carries it to the latitude of the Gulf of Finland, which is as far north as Hudson Bay in the western hemisphere. At this latitude in Russia it is not counted especially bad, but serious outbreaks occur in the new Baltic nations, formerly a part of the old empire.

The borer plague is felt especially in the south, where the cornfields of Russia merge with those of Roumania and swing eastward across the shores of the Black Sea and up the great river valleys. In the eastern part of the south Russian grain belt corn gives way to millet, which is better adapted to the drier steppes; but the borer afflicts the millet as well as the corn, and efforts are now being made to find varieties less susceptible to its attack.

Russia has no measures against the pest that have not already been recommended in the United States. The best means are the most laborious: a thorough clean-up and burning of all stalks that are not fed to cattle. The burning must be thorough, too, for according to A. Dobrodeyer, a well-known agricultural scientist, borers have often been seen emerging from stalks that were charred black on the outside, apparently none the worse for the experience. He has also seen borers coming o[illegible]

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of stalks that had been left lying about in farm yards after the feeding of cattle, although these had been tramped about for weeks in snow and frozen mud.

The great increase in corn borer infestation in Russia seems to have taken place shortly before the World War. In 1908 a 20 per cent. infestation was observed in the fields of the Government (State) of Ekaterienoslav. This initial infestation took approximately an additional 20 per cent. of the stalks in each of the following years, until by 1912 practically every stalk in the afflicted fields had its borers.

INOCULATION FOR CHICKEN POX AND MEASLES

CHICKEN-POX may be added to the list of diseases that can be prevented by vaccination. Dr. Jean V. Cooke, of the Washington University School of Medicine at St. Louis, Mo., has reported to the American College of Physicians, meeting in New Orleans, that inoculation of exposed children with serum from convalescent patients has successfully prevented cases of both chicken-pox and measles.

Though the former is sufficiently mild, a disease not to require general protective measures, its appearance in epidemics in institutions causes considerable difficulty, especially in the very young children affected. Of a total of 369 cases of exposed children, vaccinated for chicken-pox described in medical literature, Dr. Cooke declared, only 74, or 20 per cent., developed chicken-pox. Of 206 unvaccinated exposed children observed as controls, 158, or 77 per cent., contracted the disease. Such immunity is temporary but serves to protect orphanages and schools from an epidemic.

The preventive treatment for measles should be concentrated on account of the danger of complications on infants and young children under five years of age. Results with this method show, he stated, that almost 90 per cent. of children given convalescents' serum during the first week after exposure fail to develop the disease.

ITEMS

THE probabilities that the influenza epidemic now ravaging Japan will afflict this country are not great, in the estimation of public health officials. Until this disease appeared in Japan the world in recent months had been comparatively free from it. The epidemic is expected to die out with the coming of spring and the warmer weather that checks the respiratory diseases. Fall and winter are the influenza seasons and, unless this tricky disease takes a new turn, health specialists consider a spring and summer epidemic unlikely. As the spring is now further advanced in Japan than in this country, reports of the subsidence of the epidemic are expected shortly.

TURQUOISES and other rare and beautiful objects which were buried beneath an altar in Chichen Itza some 700 years ago have been discovered by Earl Morris, archeologist of the Carnegie Institution of Washington. A telegraphic report from Mr. Morris states that the space beneath the altar has not been fully explored, but ar which have been removed from their hiding place p it to be the most important cache of Maya objects k in Yucatan. A magnificent mosaic disk, containing thousand beautifully cut and polished turquoises, is nounced the most elaborate and beautiful product o Maya civilization that has ever been discovered. altar find was made in the Temple of the Warriors, is one of the masterpieces of Maya architecture. column in the temple is graven with the figure of a rior in full regalia, and it is believed that the eight more warriors are all portraits of real Maya heroes. temple, however, was built in honor of the Pl Serpent, an important Maya deity.

SPRAYING on paint with a gun, a process that has tically revolutionized finishing in the automobile ind in recent years, is under indictment as a source of siderable health hazard. A representative committee pointed by the National Safety Council, has just repo upon an investigation of twenty-nine plants and gr of workmen, including automobile and vitreous en concerns as well as contracting painters. Several men gave evidence of benzene poisoning acquired spraying benzene lacquers, while the indications of poisoning were called "distinctly significant." danger of silicosis from silica dust particles in th was apparently not so great though three positive were found. As a remedial measure the committee gested the use of what is known as the positive pres respirator for the general protection of paint spra Persons spraying compounds of lead or benzene sh receive periodic medical examination, the committee clared. It also recommended that manufacturers paints, lacquers, shellacs and vitreous and varn enamels to be used in spray coating should eliminat far as possible benzene, lead and free silica from products.

CASABA and honeydew melons have been added to list of fruits which can be given the color and tex of ripeness by treatment with ethylene gas, as a resu researches carried on by Dr. J. T. Rosa at the Univer Farm at Davis, Calif. Partly ripe melons, with rinds green and flesh still hard, were subjected to the gas concentration of one part in 4,000. They assumed orthodox "ripe" color, and their flesh became soft. sugar content, however, was not raised by the treat For this reason the hastening gas treatment is not rec mended for fruits picked before a fairly advanced st of maturity.

LOCUSTS, one of the causes of the famines that p odically threaten the great grain-raising plains of Ru are being fought with the latest means of chemical w fare from the air. During 1927, Soviet agricultural cials report, nearly 77,000 acres of agricultural lands w sprayed with chemicals from airplanes, as compared w only 2,700 acres in 1925.